United States Department of Agriculture
Forest Service
Southwestern Region
517 Gold Avenue, SW
Albuquerque, NM 87102-0084
FAX (505) 842-3800
V/TTY (505) 842-3292

File Code: 3410 **Date:** December 8, 2000
Route To: *
Subject: Spruce Aphid Evaluation Monitoring Project Proposal
To: Dwane Van Hooser, Program Manager
Interior West Resource Inventory

Attached is the evaluation monitoring project proposal for spruce aphid, *Elatobium abietinum,* in the Southwestern Region. This proposed assessment will supplement our ongoing efforts to determine impacts to spruce throughout the region. If you have any question regarding the attached proposal and need additional information please contact either John Anhold, 520-556-2073 or Bobbe Fitzgibbon, 520-556-2072.

We look forward to working with you and your group as Arizona comes on line in the monitoring program.

/s/ Leonard Lucero

LEONARD LUCERO
Director, Forestry & Forest Health

Cc:
Doug Parker
Debra Allen-Reid
John Anhold
Bobbe Fitzgibbon

EVALUATION MONITORING PROJECT PROPOSAL

PROJECT TITLE: Assessment of the effects of the exotic spruce aphid, *Elatobium abietinum,* Spruce-Fir and Mixed Conifer types in Arizona and New Mexico.

FHP PERSON IN CHARGE: Bobbe Fitzgibbon, Entomologist, Arizona Zone Office, Region 3, Forestry and Forest Health, Entomology and Pathology.

SUBJECT: The spruce aphid was found in the southwest about 10 years ago in an urban setting in New Mexico. It was reported for the first time in Arizona in 1988 in the White Mountains. It has since been found in 5 southwestern mountain ranges. Extensive defoliation has led to tree mortality during four outbreaks in the last nine years. Rapid expansion of the insect's range has caused considerable concern among resource managers. The ability of the populations in the southwest to survive in the extremely cold temperatures at high elevations during the winter is very different behavior than the behavior of populations in Europe and the Pacific Northwest, which are mainly confined to a moderated maritime climate. It is unclear at this time how much of the spruce forest in the interior west would be susceptible to the insect exhibiting this behavior.

JUSTIFICATION: Dr. Ann Lynch of the Rocky Mountain Research Station has been studying the spruce aphid in the White Mountains of Arizona since an outbreak during the winters of 1995-96 and 1996-97, and more recently in the Pinaleño Mountains further south. Mortality of the Engelmann Spruce on Dr. Lynch's White Mountain monitoring plots averaged 6% after two years; with 100% mortality recorded on some plots. The 2000 data, which is now being analyzed, indicates an increase in average cumulative mortality of 20 to 30 % during the outbreak of winter 1999-2000. The Region 3 aerial detection survey over the White Mountains recorded 115,670 acres of light defoliation and 23,180 acres of heavy defoliation on the Apache/Sitgreaves National Forest, Fort Apache Indian Reservation, State trust and private land. The forests in Arizona are experiencing drought conditions, and repeated defoliation under these conditions could yield considerable spruce mortality.

In late 1999 and early 2000, spruce aphid infestations were discovered in the Pinaleño Mountains and the San Francisco Peaks for the first time. These ranges are widely separated and have large areas of woodlands between them and other ranges with spruce type. Determining the environmental limits of this insect is needed to predict the potential range of spread. Severity of defoliation appears to vary, either by gross geography or by season, or both. Defoliation in 1999-2000 was much more severe in the Pinaleños than in the White Mountains, and more severe in 1996-1997 and 1999-2000 in the White Mountains. Additionally, more work is needed to identify topographic and vegetation factors associated with defoliation, analyze effects of repeated outbreaks, determine risk factors associated with tree mortality, and look at factors that might lead to an outbreak.

SCOPE OF THE APPLICATION: The most narrow scope of the project would be spruce aphid impacts on the spruce type in the southwest. However, the potential range of this insect is unclear and the scope could include all of the spruce type in the interior west.

METHODS: Both permanent and ephemeral plots have been established in the White Mountains and Pinaleño Mountains of Arizona. Plot establishment will be expanded to include the San Francisco Peaks on the Coconino N.F., the north rim of the Grand Canyon on the North Kaibab N.F., the Sacramento Mountains on the Lincoln N.F., and the spruce type on the Gila N.F., where the insect is either known to exist or the potential for infestation exists. Sample design will be established to a) monitor the presences, absence, and pest status of spruce aphid throughout the host type, and b) validate and locally calibrate relationships developed from the White Mountains and Pinaleños, where sampling will be more intensive. Plots will be established systematically on grids or transects where possible. Where access and terrain prevent systematic or random plot locations, plot locations will be chosen to represent the variety of stand conditions that include spruce. Site and vegetation data, including regeneration, will be collected compatible with Stage II Stand Exam protocols. Defoliation and mortality surveys will be completed on an annual basis on plots in mountain ranges where the aphid is established. Plots in areas not know to be infested will be checked but not measured on an annual basis. Some seedlings and saplings near the plots will be destructively sampled to determine tree age, develop relationships for time to reach dbh, and evaluate the amount of regeneration established in the last decade.

Optical temperature data loggers will be placed in some locations to monitor temperature regimes within the host type. This will enable calibration of existing RAWS or NOAA data to host conditions. This data, combined with more intensive aphid population monitoring efforts by Dr. Lynch in the Pinaleños and San Francisco Mountains, will facilitate identification of temperature regimes associated with aphid outbreaks.

PROJECT BUDGET:	**FY 2001**	**FY 2002**	**FY 2003**
Salaries for seasonal crews Plot establishment, Measurement and data entry – 2/year 4-4.5 mo.	$16,500	$15,500	$15,500
Travel for 2 persons 4-4.5 Months.	$13,500	$12,000	$12,000
Vehicle Lease, gas SUV, 4 mo.	$2,500	$2,500	$2,500
Supplies	$ 3,500	$1,000	$1,000
TOTAL	$36,000	$31,000	$31,000